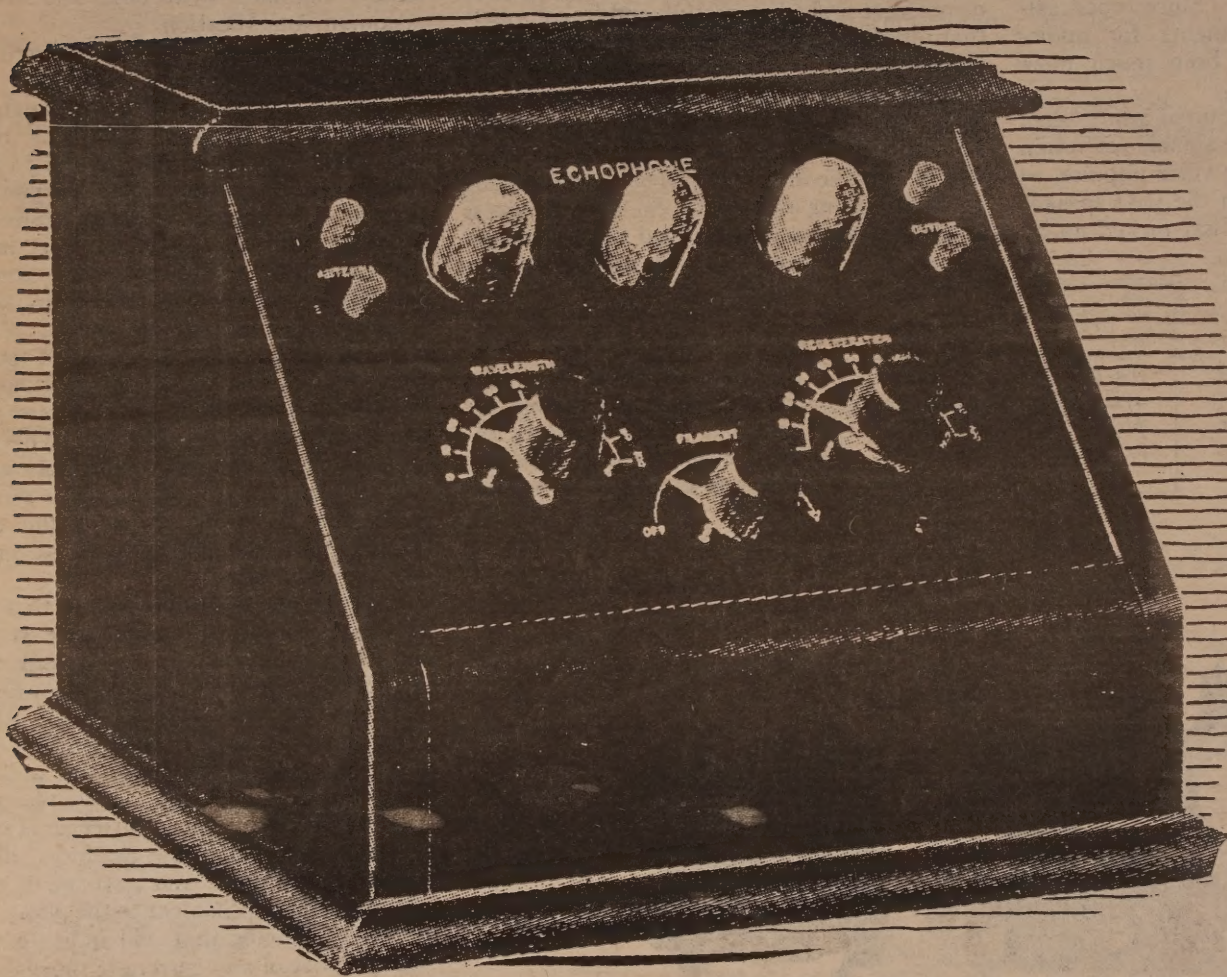


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THE HORN SPEAKER



The Echophone "V-3"

3-Tube Regenerative

How the C Battery Prevents Distortion

Your Amplifier Need Not Distort Signals If You Know How to Apply the Proper C Battery Voltage to the Grid

By JOHN F. RIDER

TRANSFORMER-coupled audio-frequency amplification is almost as old as the three-element vacuum tube, yet its refinements are just appearing before the public. Before broadcasting became popular, when spark and CW signals dominated the ether, distortion in an audio-frequency amplifier was a rare complaint. The character of the signal did not require distortionless amplification. Very little attention was paid to the design of amplifiers, if the desired amount of volume amplification was obtained. Since broadcasting came in, the requirements for audio-frequency amplifiers have been much more exacting.

To-day, amplifiers are required which shall increase the intensity of the signal, yet retain all the fine variations of the voice impulse, so that the music emitted from the loud speaker is an exact reproduction of that picked up by the microphone in the studio. Even if the transmission is perfect, entirely without distortion, and if the detection is perfect, nevertheless the signal is distorted after passing through a two-stage amplifier. What has caused the distortion?

The C battery eliminates distortion, increases the life of the B battery, and makes the audio amplifier more economical to operate.

Fig. 1 is a schematic diagram of a standard two-stage audio-frequency amplifier. One can readily see that there are only two parts of the amplifier which can cause distortion: the coupling transformers and the vacuum tubes. In which of these two does the trouble lie? Extensive experiments have been made and are continually being made by the manufacturers of audio-frequency transformers, in an endeavor to produce a transformer that operates perfectly on all frequencies encountered in the broadcasting of voice and music. Their experiments have proved successful, and transformers that function admirably in that respect are now on the market. Therefore, let us also assume that the transformers in the amplifier have been matched for the tubes and are perfect. The entire unit operates excellently on weak signals, but the distortion persists when strong signals are being amplified. So, by the process of elimination, we have arrived at the vacuum tube as the source of our troubles.

We find by experience that, by reducing the brilliancy of the filament, we can minimize the distortion to a certain degree, but this method is unsatisfactory, as it results in a decrease of signal intensity.

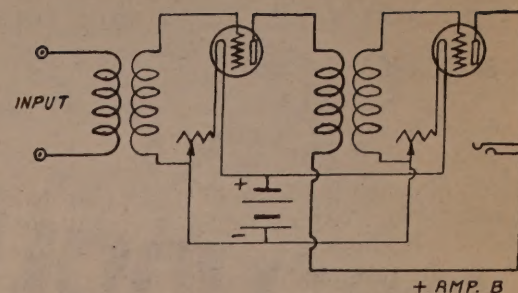


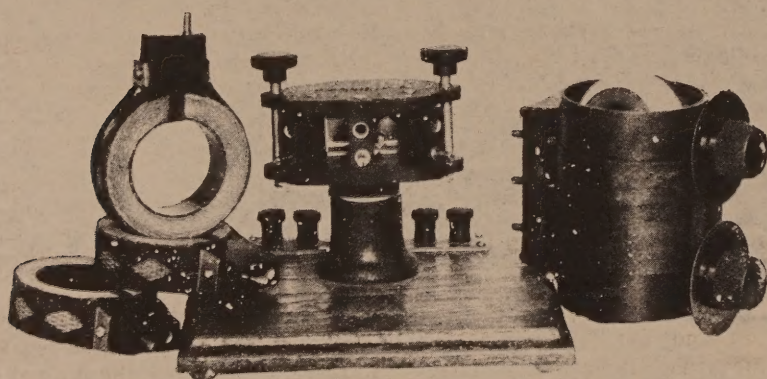
FIG. 1

Two-stage audio amplifier. If the transformers are of reliable make and matched for the tubes, any distortion must occur in the tube circuit.

Therefore, we will focus attention upon the vacuum tube and see what part it plays in the amplifier. Also what other apparatus, if any, must be added to the amplifier so that the vacuum tube will operate with maximum efficiency, eliminate distortion, and still afford maximum amplification.

What is the three-element vacuum tube as used in our present-day amplifiers? It is an instrument consisting of an evacuated bulb, containing a filament that can be made incandescent so as to emit electrons; a grid, and another metallic object called the plate. Further, it is a voltage-operated device, which, when an alternating potential is impressed upon the grid, will produce the same alternations in the current flowing in the plate circuit but of greater amplitude. Now the question might arise in the mind of the reader: How can distortion occur in a vacuum tube if the alternations impressed upon the grid are reproduced in the plate circuit? This can best be explained by means of a plate-current, grid-voltage characteristic curve (Fig. 2). Before going into the explanation of the curve, a few remarks concerning the plate current might help the uninitiated.

Experiments have determined that when a filament is contained in an evacuated chamber and made incandescent, it will emit electrons at a certain rate per second, the rate depending upon the degree of incandescence. Also, that when another metallic object in the form of a plate is placed into that chamber and given a positive charge in respect to the filament (the positive terminal of the B battery is always connected to the plate), the electrons will be attracted to the plate, and a stream of electrons will flow from the filament to the plate. Now if we place a meter that will indicate the flow and quantity of any current in the plate circuit, we will find that when there is a flow of electrons within the tube (from filament to plate), there is a certain value of current flowing in the plate circuit. So we can say that the electronic flow is equal to a current flow within the tube. And we find that by varying the brilliancy of the filament (thus varying the number of electrons that are emitted from the filament per second), we can vary the plate



A DE FOREST COIL MOUNTING

To which the remainder of the receiving circuit is connected by six binding posts (two are behind the center support). Two of them are connected to the primary; two to the secondary and two to the tickler

current; also, that we can vary the plate current by varying the value of the voltage applied to the plate, for the greater the positive charge on the plate, the greater its attracting power, and a greater number of electrons are attracted to the plate. The plate current corresponds to the number of electrons reaching the plate per second. If we maintain the filament current constant and the plate voltage is also maintained at a constant value, there will be a definite number of electrons flowing across inside the tube, and the plate current will be constant. This value of the plate current is usually expressed as the amount of current the tube draws. When the plate voltage is held constant and the filament current varied from minimum to maximum, there will be a variation in the plate current from minimum to maximum. The maximum indicates that the positive charge on the plate has attracted all the electrons possible, and any increase in filament current in order to increase the number of electrons emitted will be of no use. When this stage is reached, we have reached the saturation point of the tube, i.e. for that plate voltage.

Now let us go back to the characteristic curve of the tube. We are to illustrate how distortion may occur within the vacuum tube, and we shall also show how it can be eliminated. The curve illustrates the operation of a three-

alternating positive and negative charge is therefore applied to the grid. This is shown by YJ as the negative charge and YK as the positive charge. By following up the vertical lines at these points and noting where they cross the plate current curve then following the horizontal line at that point toward the left vertical line, we see the value of the plate current in each case. The negative charge upon the grid has reduced the plate current a certain value below normal, and the positive charge upon the grid has increased the plate current the same value above normal. This phenomenon occurs because when there is a negative charge upon the grid it repels some of the electrons emitted from the filament and less travel to the plate, hence the plate current is reduced; the opposite is true when the grid is charged positively. The grid attracts electrons and a greater number travel to the plate, increasing the plate current. Expressing this differently, we can say that when the grid carries a positive charge it increases the attracting power of the plate. By glancing once more at the curve it will be noted that the increase and decrease in the plate current are exactly proportional to the grid potential variations, but are of greater magnitude; so the wave-

yond the saturation point. Since the variations in the plate current are not exactly equal, the wave-form in the plate circuit is not an exact reproduction of that applied to the grid. The effect of this is distortion. Thus distortion is produced within the vacuum tube in amplifying circuits.

What is the remedy for this situation? To reduce the grid voltage would reduce the amplification. That would never do, for maximum amplification is generally desirable; therefore, we must reduce the normal plate current to such a point that equal increase and decrease will be produced in it by the grid voltage variations. Expressed differently, the operating point (normal plate current) must be shifted to such a position that the plate current variations will be equal at all times, and this point is midway between the two bends. We can do this by two direct methods:

1. By reducing the filament brilliancy, thus reducing the electronic emission.
2. By reducing the plate voltage, thus reducing the attracting power of the plate.

Neither method is completely desirable, for in each case we would not obtain maximum amplification. We shall have to resort to an indirect method of shifting the operating point

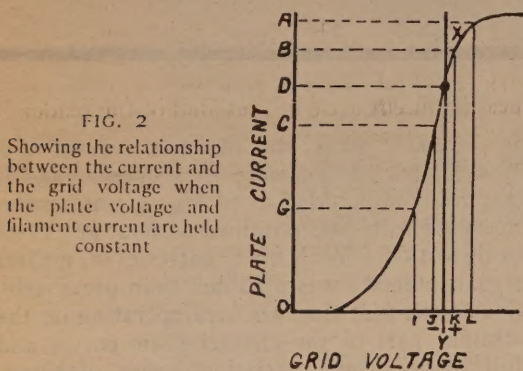


FIG. 2
Showing the relationship between the current and the grid voltage when the plate voltage and filament current are held constant

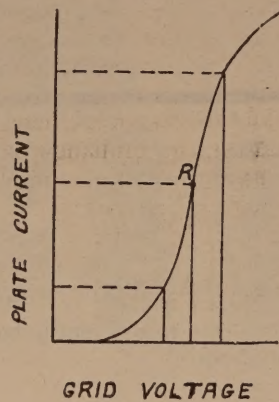


FIG. 3
Showing the "characteristic curve" when C battery (grid bias) is used

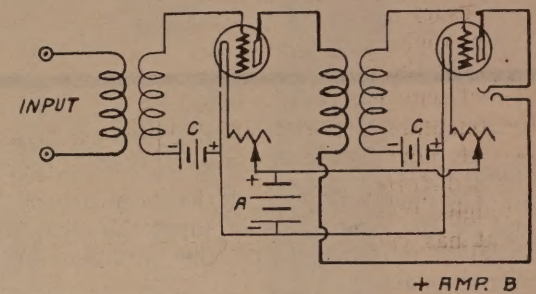


FIG. 4
Showing how the C battery is connected in an audio-frequency amplifier

element vacuum tube as an amplifier, by showing the relationship between the plate current and the grid voltage, when the plate voltage and the filament current are held constant. The vertical line on the extreme left indicates the value of plate current (usually expressed in milliamperes); the horizontal line, on the bottom, the grid voltage; the vertical line in the center, the zero line, i.e., the dividing line between negative and positive grid voltage. To the right of this line is positive grid voltage and to the left, negative. The curve shows the variation of the plate current, and the bend X is the saturation point. Assume that the curve illustrates the characteristics of a UV-201-A as an amplifier with a plate voltage of $67\frac{1}{2}$ Volts. The dot on the curve and point D on the left-hand line indicates the normal plate current as explained in the preceding paragraph. Now suppose that an incoming signal of a medium intensity has been impressed upon the grid. The applied potential being of alternating character, an

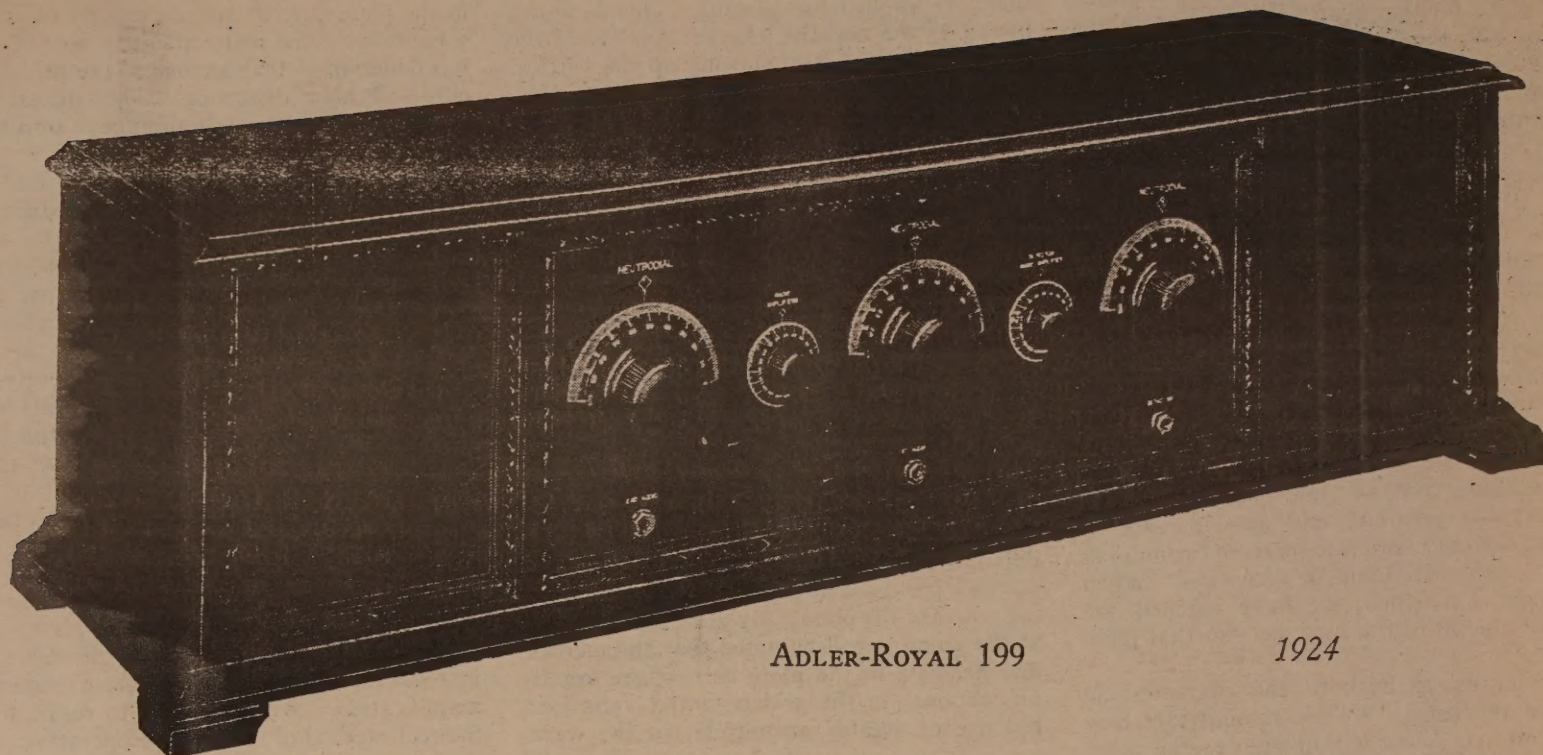
form in the plate circuit will be exactly the same as those in the grid, and no distortion will take place in this case.

Let us now assume that the signal has passed through one stage of amplification, or that the original input has been greatly increased. What happens when a stronger signal is applied to the grid? Since the signal is of greater intensity on being amplified, the alternating potential that is impressed upon the grid is greater. This is indicated by YI and YL, the former the negative charge and the latter the positive. We follow the various lines through once more, and note that the negative half of the applied grid potential has produced the plate current variation DG, and the positive half the variation DA, but that the two variations are not equal and therefore are not exactly proportional to the grid potential variations. The reduction in the plate current for the negative charge on the grid is greater than the increase for the positive charge, and the increase has been carried be-

Do you know just how your tube works? What difference does it make if you apply more B battery, or more filament voltage? Mr. Rider answers these questions in this article.

of the tube. We shall utilize the grid, we can either increase or decrease the plate current. As we want to reduce the normal plate current to a certain point, we place a constant negative charge upon the grid. This calls for the insertion of a source from which we can obtain this negative charge.

The most logical source would be a battery, and that is the means employed in actual practice. This battery is called the C battery, and is sometimes known as the "grid bias." The battery is connected as shown in Fig. 4, and we apply just enough negative potential to the grid to reduce the normal plate current to the point where changes in the grid potential due to the incoming signal, will produce equal increases and decreases in the plate current. Therefore, by means of the C battery, we can confine ourselves to operation on the straight portion of the characteristic curve, and place the operating point midway between the two bends. In this way, the symmetry of the oscillations applied to the grid are faithfully reproduced in the plate current, the variations are proportional, and distortion is eliminated. Further, the greatest amount of variation is obtained in the plate current for the grid potential variation, and maximum ampli-



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cation is also obtained. This is shown in Fig. 3. The operating point, R, has been reduced, and for the same value of input the greatest variation is obtained and the variations are proportional.

Fig. 4 is the same as Fig. 1, except for the C battery between the grid return lead of the transformer and the negative terminal of the A battery. That point is the proper position for the battery, and not between the grid of the tube and the grid terminal of the transformer.

The patent rights for the use of a C battery in an amplifier are owned by certain radio concerns, and because of their refusal to grant other manufacturers this right, separate C batteries are not found in the average amplifying unit. There is no ruling that forbids the radio fan to insert such a battery in his own amplifier. To overcome this patent situation, other methods of obtaining a negative grid bias are resorted to by the manufacturers. One is to connect the grid return of the transformer to the negative terminal of the A battery, and another to place the filament rheostat into the negative lead of the A battery and connect the grid return of the transformer to a part of the rheostat, so as to apply the voltage drop across the rheostat to the grid of the tube. These methods are limited in their degree of efficiency, since the required value of "grid bias" might be more than that obtainable by the above means. The value of the C battery is best determined by experiment, as it depends upon the controlling constants of the tube. The following table offers a close approximation to the C battery voltages to be used with a given plate voltage.

PLATE VOLTAGES	C BATTERY VOLTAGE
40	0.5 to 1.0
60	1.0 to 3.0
80	3.0 to 4.5
100	4.5 to 6.0
120	6.0 to 9.0 (not to be used with UV-199's or C-299's)

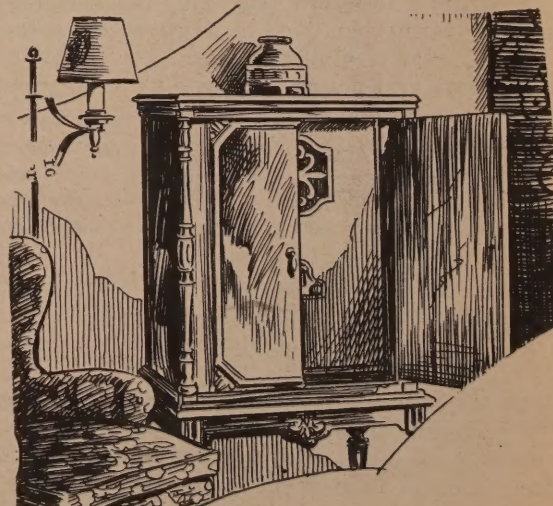
The C battery:

1. Eliminates distortion.
2. Reduces the normal plate current, thus increasing the life of the B battery and making the amplifier more economical to operate. This is illustrated by the following experiments:

A receiver consisting of a regenerative detector and two stages of audio-frequency amplification, as in Fig. 1, was put into operation. The amplifying tubes were VT-2's and drew approximately 1.2 amperes on the filament. A potential of about 150 volts was applied to the plate. The signal strength on local stations was tremendous, but the music was distorted. A milliammeter was placed into the plate circuit, and with above filament current and plate voltage, the two tubes drew approximately 32 milliamperes normal current. To minimize distortion, the filament current was reduced until the music sounded best (i. e., till amplification was best), yet the tubes drew 22 milliamperes. (It can be readily seen that with this amount of current being drawn from the B batteries, they cannot last very long. That is the case with many amplifiers in use to-day. The operators are told to increase the plate voltage if they desire greater signal strength. That is true, but the other constants must also be in proportion, if efficient operation

is desired.) Now the filament current was brought back to normal—1.2 amperes—and C batteries were added as in Fig. 4, until maximum intensity was obtained without any trace of distortion. With the C batteries in, greater signal intensity was obtained than previously, due to the fact that we were operating on the straight part of the characteristic curve, and full plate-current variations were obtained. When in this state, the reading on the milliammeter was noted, and it was only 5 milliamperes for both tubes. The increase in the life of the B battery is readily apparent.

A great deal of the distortion that is attributed to the loud speaker may be taking place within the second stage of the amplifier. Who can tell?





A display of tubes from the Paul Crum collection.

What's What About Radio Horns

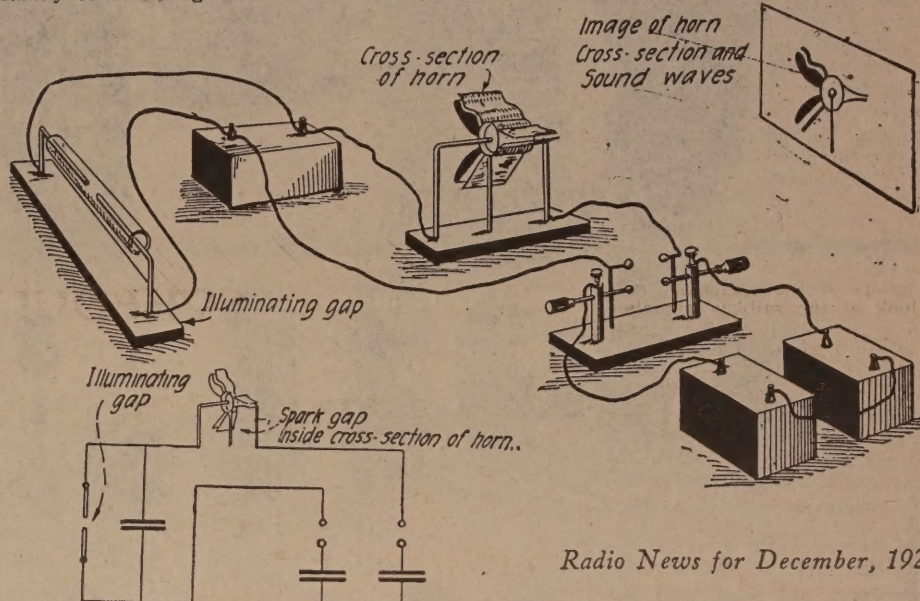
By CARTER FISKE

A description of some interesting tests made to determine the behavior of sound waves in loud speaker horns.

ALTHOUGH the radio horn is apparently one of the least technical things about a radio set, it is at the same time the least understood. The physical appearance of a thing is not always an indication of the way in which it functions. A piece of newspaper wound into a cone makes a horn, but the way the sound waves leaving the diaphragm of our loud speaker unit act when they burst forth from this horn is quite another matter. The most peculiar thing about the simple megaphone is that physicists themselves are not familiar with its operation and they are constantly contradicting each other. One says,

If there is anything that will chew up and destroy the symphony and harmony of a good reproducing element it is a poorly constructed horn. Since no two reproducing elements of different design have the same acoustic properties, it is evident that the horn which will serve one efficiently will not serve the other. All the logic of the physics of sound point to the necessity of designing a special horn to fit each reproducing unit.

We have some especially good horns today, and in every case they are produced by manufacturers who thoroughly appreciate the magnitude of the problems that con-



The apparatus used in the experiments described in this article.

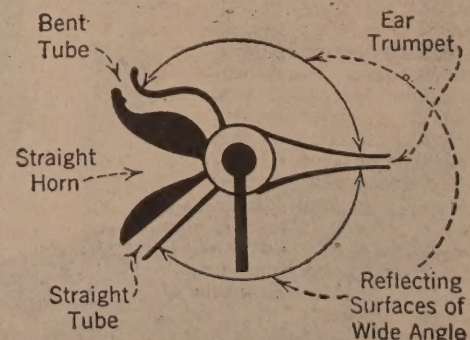
"It is this way," and another says, "No, it is this way."

Now a radio horn is a mighty important part of a radio outfit—far more important than the average radio fan realizes. In this regard, it is interesting to know that the phonograph manufacturers had many worries over the horn for their reproducing unit. They spent barrels of money in experimentation and they found that the various horns they used made a world of difference in the quality of the music. Whether the horn was large or small, of tin or wood, long or short, round or square, made a great difference.

It is evident that a radio horn performs the same function as the phonograph horn. We have the diaphragm of the reproducing element. At the small end of the radio horn we have exactly the same thing. The problem is the same, yet what manufacturer of radio horns has spent the money that the phonograph people spent on the same problem? Not one, indeed. The art is too young, and it goes without saying that 95 per cent. of our horn manufacturers completely overlooked the technicalities of the problem and simply went out and bought a stock horn to fit their reproducing element. This procedure is fundamentally wrong to say nothing of being unscientific. Consequently we have numerous loud speakers on the market not worth the powder to blow them up with.

front them. They have spent money experimenting, and as a result they put forth a product which was as well as could be expected considering the youth of the art. With due respect to the efforts of these conscientious manufacturers—God bless the few of them—the author still holds that there is a great deal of room for improvement. The market is still thirsty for a horn that will give absolutely faithful reproduction for all the varied frequencies that come forth from the loud speaker.

If the author were purchasing a radio
(Continued on page 972)



The sound produced in the center of this instrument is amplified through the various horns attached to it and photographed in rapid succession. These pictures are shown on the left.

These pictures show the propagation and reflection of sound waves through various shapes of horns.

horn he would shop for days until he found one that would suit his sense of musical values. Many fans assemble their outfits with great care, choosing their transformers, sockets and vacuum tubes with infinite pains, and yet buy the first radio horn they see. The chances are about 95 to 1 that they buy the wrong horn and then wonder why the quality of the reproduction is so poor, never once thinking that their troubles might be located in such a simple thing as the horn. To many people, a horn is simply a horn, but these people do not fully appreciate the peculiar properties of sound waves and their associated phenomena.

Experimentation has caused the sound physicist to vote the metal horn out of order. Regardless of its design it is responsible for a finnish tone and is altogether too resonant to be suitable. A horn should be made out of a non-resonant material such as wood, fibre or paper mache.

There are a lot of other fallacies about loud speakers. They are called amplifiers by those who do not understand their operation. Just how they amplify is quite a mystery if we are to still maintain our respect for the law of the conservation of energy. If a horn can be made to amplify, why use vacuum tubes? The truth of the matter is that they do not amplify. They concentrate and condense. When we take the horn from our loud speaker unit, the sound waves it produces spread out in all directions, just like an electric light without a shade. When we put an electric light in front of a reflector the light is concentrated and shoots off in one direction. Such a light can be seen a greater distance than a light that is shooting its rays off at all points of the compass. As proof of this, look at the railway signals. A radio horn acts in much the same manner. When it is put over the loud speaking unit the sound waves are concentrated and they come forth in much the same way that they leave the mouth of a person.

As the author has said, many of the great sound physicists are in thorough disagreement regarding the phenomena associated with horns, or megaphones as they are called. One peculiar thing about them is that the darn things appear to amplify at both ends. When the sound is put into the small end it comes forth from the large end apparently increased in volume, and when a deaf person puts the small end to his ear and the sound goes in the large end it would also appear that amplification is effected.

Let us hear what Lord Raleigh has to say in his famous book, "The Theory of Sound." "The case of progressive sound waves moving in a tube of variable section is also interesting. In its general form the problem would be one of great difficulty, but where the change of section is so gradual and no considerable alterations occur within a great many wave-lengths, the principle of energy will guide us to an approximate solution. It is not difficult to see that in the case supposed, there will be no sensible reflection of the wave at any part of its course, and that the energy of the motion must remain unchanged. From which it follows, that, as the waves advance, the amplitude of vibration varies inversely as the square root of the section of the tube. In all other respects the type of vibration remains absolutely unchanged. From these results we may get a general idea of the action of an ear trumpet. It appears that according to the ordinary approximate equations there is no limit to the concentration of sound which may be produced in a tube of gradually diminishing section."

Needless to say, there are lots of physicists who do not agree with Lord Raleigh. In this connection it is interesting to briefly review the work of a man who has recently actually photographed sound waves as they

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SCHEDULE OF EVENTS

FRIDAY, OCTOBER 21, 1988

12:00 - 4:00 P.M.

National Broadcast Museum open

6:00 - 9:00 P.M.

Registration and Auction check-in

7:00 P.M.

Social Hour (Cash Bar)

SATURDAY, OCTOBER 22, 1988

8:00 - 4:00 P.M.

Registration

8:00 - 11:00 A.M.

Auction equipment check-in

8:00 - 10:00 A.M.

Contest equipment check-in

10:00 - 12:30 P.M.

Viewing of Auction equipment

10:00 - 1:00 P.M.

Viewing of Contest equipment

10:00 - 12:00 Noon

Silent Auction

12:00 - 1:45 P.M.

Ladies Luncheon (\$10.00)

12:45 - 1:00 P.M.

VRPS Annual meeting and election of officers

1:00 - 5:30 P.M.

VRPS annual Auction

5:30 - 7:00 P.M.

View Contest equipment

7:00 - 7:30 P.M.

Cocktails

7:30 P.M. -

Awards Banquet and Speaker

SUNDAY, OCTOBER 23, 1988

8:00 - 12:00 Noon

Flea Market (Indoors)

12:00 - 4:00 P.M.

National Broadcast Museum open

originate and leave various shaped horns. This man is Arthur L. Foley. Mr. Foley holds that seeing is believing. He became tired of reading the contradictions of sound physicists, so he rigged up an electric apparatus which will allow him to photograph sound waves. The device is extremely simple and we see it pictured in the sketch. In place of using the regular conical shaped horn, Mr. Foley employed what would amount to a cross-section of a horn. This cross section he made up of brass plates. In the sketch AA are spark gaps and BB condensers. C is another spark gap employed for illumination purposes. D is another condenser, and E is a photographic plate. In the center of the dummy horn there is another spark gap which is used primarily to set up the sound waves. The whole device is operated from a small spark coil. When a spark passes across the gaps a shadow of the horn is thrown upon the photographic plate by the light-giving gap C. This throws not only a shadow of the horn, but of the sound waves as well. Since we know that sound effects the density of air it is evident that the light will also leave an impression of the waves. In some of the photographs attached, Figs. 2 to 7, Mr. Foley shows the successive stages of an expanding wave, the average time interval between each of the six wave processes being about a 300,000th of a second. The pictures show that there was energy reflection in every wave; except when the wave front was at right angles to the surface of the air parallel to the surface of the tube. During these experiments Mr. Foley brought forth the fact that the condensing power of a horn is not the quotient of the area of the two ends, that it is not even of the order of magnitude in the size of horns of considerable angle.

Mr. Foley's general conclusions follow:

1. The amplifications of sound at the small end of a conical receiving horn is due to both resonance and condensation.

2. The amount of sound energy "condensed" at the small end of a conical horn receiver is but a small fraction of that demanded by the "condenser" theory. This theory is not tenable.

3. Sound pulses do not "glide around bends" in tubes and "slip" along slanting walls "without appreciable reflection." There is reflection at a surface wherever the molecules of air next the surface vibrate in any direction not parallel to that surface. Huygen's construction applies in every case.

4. Much of the energy of the waves reflected in a crooked tube of small angle may eventually emerge at the far end, but the several waves arrive at different times. Thus the form of the emerging wave may be widely different from that of the entering wave.

5. Much of the energy of a wave entering the large end of a conical horn is reflected and eventually leaves the horn at the end it entered. The wider the horn angle the greater the per cent. of energy thus "lost."

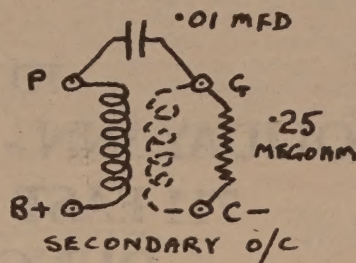
6. Of the energy of an emerging sound wave the per cent. reflected at the open end of the tube is small.

Now that we have a method of actually seeing sound waves and the manner in which sound waves effect them, the day when we shall have a perfect radio loud speaker is not so far away.

AUDIO FREQUENCY Transformer

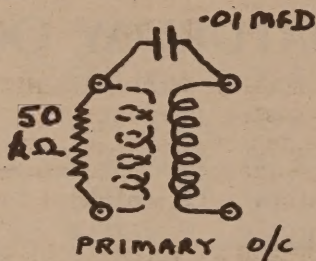
Ric Havyatt VK2ACZ

In the area of interstage audio transformers considerable trouble is experienced in most old radios. Corrosive soldering flux, acidic insulating papers and good old electrolysis between windings and core all take their toll. In most cases this means that the transformers are beyond all hope and a complete rewind is necessary to restore their transformer action. However, in some cases, application of high voltage d.c. across



an open circuit winding will restore continuity. Voltage necessary is 300 to 400 and success ratio is only about 1 in 3 or 4. The theory behind this is that welding of wires can be induced where, for instance, soldering flys has corroded the fine winding wire at the point where it is joined onto the heavier connecting wires. The other transformer winding should be short-circuited to prevent excessive induced voltage should the treatment be successful.

As an alternative to complete replacement of a defective transformer in which one winding is still intact, the addition of a couple of components can restore the set to working order:--



The additional components are a .01 MFD paper or polyester capacitor connected between P and G terminals of the transformer and a suitable resistor across the terminals of the defective winding. Appropriate resistor values are indicated in the diagrams. This procedure will reduce the gain of the amplifier but a small bonus will be slightly improved audio quality.

Mr. Durell M. Roth has had medical problems. We look forward to his quick recovery and his return to his column, RESTORING ANTIQUE RADIOS.

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X ALTON H. BOWMAN X
X 4172 EAST AVE., RD 2 X
X CANANDAIGUA, NY 14424 X
X X
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guide, Tubes, books, and parts. Send SASE to Housel, 1816 S.W. 12, Lincoln, NE 68522.

ELECTRONIC ORGAN SCHEMATICS AND MANUALS. SASE FOR PRICE QUOTES. MANY MAKES AND MODELS. ALTON H. BOWMAN, 4172 EAST AVENUE, RD 2, CANANDAIGUA, NY 14424.

FOR SALE — GENERAL

LARGE MAHOGANY WALL TYPE TELEPHONE with shelf, magneto and bells. 30" high X 10" wide. Two carbon button mikes.. one double button and one single WESTERN ELECTRIC. Some blue Amberol cylinder records. Aeriola Senior radio, some plastics. R. Matson, RFD#1, Box 2943, Kennebunk, ME 04043. (207) 985-3751.

PHILCO CATHEDRAL MODEL 70, EXCELLENT, 01A TUBES, NEUTROWOUND BATTERY SET WITH SPEAKER, 2 OLD TELEPHONES. RUSSELL SCHOEN, E 7340 NIETZHE ROAD, CLINTONVILLE, WI 54929. (715) 823-6744.

RME 69 EARLY RECEIVER. rack mount, generally good, weak on 160 meter band \$95; loose coupler, unusual replica \$35; crystal grinding outfit \$15; very early RCA/GE/Acme transmitter power supply transformer and choke (for Vu-202 & such) iron case \$45; Polaroids \$1.00@. All plus UPS. Paul C. Crum, W9LC, 6272 N. Cicero Avenue, Chicago, IL 60646. (312) 282-3033.

FOR SALE: NEW AND USED TUBES, Electrolytic capacitors, cone speakers. Send SASE for lists, C. Elmer Nelson, 11 S. Church Street, Princeton, IL 61356.

FOR SALE: ANTIQUE (1924 VINTAGE) ATWATER KENT BREADBOARD MODEL 10A IN ALMOST MINT CONDITION, WITH FIVE GOOD UX201A'S INCLUDING MODEL M HORN SPEAKER. WARRANTY AND INSPECTION TAGS ARE OK. \$700.00 PLUS SHIPPING AND PACKING. PREFER NOT TO SHIP. WILL CONSIDER SELLING SET OR SPEAKER SEPARATELY. LEO GIBBS, W8BHT, 701 BROOKFIELD ROAD, KETTERING OH 45429. (513) 299-3965.

NATIONAL HRO. OLDER PIN TYPE TUBES. Rack mount. With six coil set (not continuous). Fair shape. \$95; RME 69, rack mount (no cabinet; fair/good \$95; Two meter composite AM transceiver. Works! \$15; One WE 101D tube. Good filament. \$20.* Paul C. Crum, W9LC, 6272 N. Cicero Avenue, Chicago, IL 60646. (312) 282-3033.

FOR SALE— New and used tubes, capacitors, cone speakers, have

over 500 different types of tubes— used from 40 cents, new from 95 cents. Send SASE for lists, C. Elmer Nelson, 11 S. Church Street, Princeton, IL 61356.

DANCING LADIES SPEAKER, Stewart Warner model 305, Stewart Warner speaker, American Bosch model 360, Silvertone model 1386, Philco 66, Clarion Jr. 320 superhetrodyne, small mirror tone deluxe," ivory colored radio with red knobs, case only for a Kennedy cathedral. Send for new list. Clifford Schoen, 549 Fulton St., Seymour, WI 54165. Phone (414) 833-2429.

FOR SALE: RADIOLA MODEL II 225.00, 11 pr. Newcomb headsets 2.00 pr., Junker Magnavox TRF model D 15.00, 1930's Zenith junker tombstone 10.00, model 3970 Philco battery tombstone 15.00, UZ-1325 horn only 10.00, table model 1950's Admiral

electric radio with phonograph 10.00, model 10728A Philco Transitone 10.00, late 20's American Bosch electric set with 8 tubes 50.00, 1950's Studebaker car radio 20.00, 1940's Zenith push button electric radio (plays) 25.00, U.P.S. extra, Larry Chambers, 5026 Suter Drive, Nashville, TN 37211, AC (615) 833-2448.

FREE: Send 2-stamp LSASE for just released Flyer, NO. 188c to: Olde Tyme Radio Company, 2445 Lyttonville Road, Silver Spring, MD 20910.

MANY THOUSANDS OF OLD TUBES. LARGE 80, 81, 82, 83 BOXES OF WESTERN ELECTRICS RECEIVING AND TRANSMITTING TUBES, PEANUT TUBES, METAL TUBES, E. H. SCOTT TUBES, BOXES OF LOCTALS AND OCTALS. IV TUBES. ALSO FIRST EDITION RIDERS

SUBSTITUTION GUIDE BOOK. ONLY SELLING ALL U PICK UP. TUNGAR BULBS. TO: BASIL ABBOTT, #4 BUNKER HILL, RICHARDSON, TX 75080.

FOR SALE: to receive America's best list of radios, tvs, mags, etc.. send \$1.50 for current list to: Jim Clark Enterprises, Dept., HS, 1292 Starboard, Okemos, MI 48864.

FOR SALE. MUST SELL MOST OF MY HOBBY: RADIOS, CONSOLES, TEST EQUIPMENT, AMATEUR RADIO RECEIVERS, TRANSMITTERS, PARTS, TUBES AND MAGAZINES. PLEASE TELL ME WHAT YOU WANT— CAN SEND LIST OF YOUR REQUEST FOR SASE. R. W. OLMSTED, K4UJZ, 608 W. THOMPSON LANE, MURFREESBORO, TN 37129. (615) 893-5344.

RIDERS, HOWARD SAMS, RCA, PHILCO, SERVICE DATA. TEST EQPT., PARTS, TUBES, NEW 1988 LIST. SASE. KRANTZ,

THE BIG SALE IS HERE

ARS Enterprises
P. O. Box 997
Mercer Island, WA 98040

The big annual ARS Sale is here again. Take advantage of these great deals while they last. All items subject to prior sale. Sale ends with the next edition of The Horn Speaker, so act now!

[]-SPECIALTY INDEX: Contains indexes to ARS' Specialty Servicing Manuals. Covers the period 1926-1950. Regularly \$7. Now just \$4 for a limited time. SI-1

SUPREME RADIO VOLUMES: 1941, 1942, 1946 just \$10 each, a savings of \$7 from the regular \$17 price. Or order all three for just \$25 and save more!

[]-1941 \$10 []-1942 \$10 []-1946 \$10 []-All 3 \$25

[]-PRACTICAL RADIO MATHEMATICS: Explains electronic terms and concepts: Ohm's law, current, wattage, series and parallel circuits, capacitance and inductance. Useful formulas too. Regular price is \$4. Price slashed for sale to just \$1. GA-3

SUPREME TV VOLUMES: [] TV-17 (1960) and [] TV-20 (1962 Late) normally \$4 each now just \$3 each.

[]-TEN POUNDS OF ELECTRONIC DATA: fact sheets, technical publications, diagrams, instructions, catalogs, magazines. Regularly \$8.95, just \$6.95 here. SD-1b

NAME _____
ADDRESS _____
CITY _____
STATE _____ ZIP _____

TOTAL FOR BOOKS ORDERED...\$ _____
8.1% Tax (WA State only). _____
Shipping and handling*... 2.50 _____
TOTAL ENCLOSED.....\$ _____

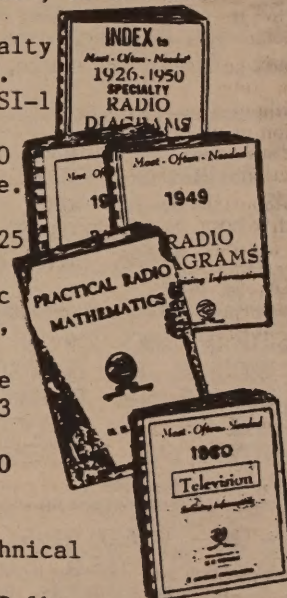
*Foreign orders must add actual shipping costs

[]-CHECK []-MONEY ORDER
[]-VISA []-MASTERCARD

ACCOUNT # _____
EXP. DATE _____ HS488

[]-FREE CATALOG

SIGNATURE _____



100 OSAGE AVE., SOMERDALE, NJ 08083.

SEND LARGE SASE for list of radios., Donald Juleen, 6252 Ledge Road, Sturgeon Bay, WI 54235.

FOR SALE — PHILCO

PHILCO 95TH ANNIVERSARY limited edition cathedral radio, AM/FM transistor chassis, look a like to Philco model 90 — 1932— collector's item, only \$89.91 plus \$5.00 shipping. Maurer TV, 29 South 4th Street, Lebanon, PA 17042.

FOR SALE — TUBES, PARTS, ETC.

30 DAY SALE: New tubes in original cartons \$1.50 each. 1X2, 2BN4, 2CY5, 2FS5, 3AL5, 3AU6, 3BC5, 3BN6, 3BU8, 3BZ6, 3CB6, 3DK6, 3DT6, 3Q4, 4BC8, 4BQ7, 4CB6, 4EH7, 5AN8, 5AQ5, 5AT8, 5BK7, 5BQ7, 5BR8, 5CG8, 5CL8, 5T8, 5X8, 6AG5, 6AH6, 6AQ6, 6AS6, 6AT8, 6AX5, 6BA8, 6BC5, 6BC7, 6BC8, 6BH8, 6BK7, 6BN4, 6BQ7, 6BY6, 6BY8, 6CB6, 6CG7, 6CL6, 6CQ8, 6CS6, 6CZ5, 6DE6, 6DR7, 6DT5, 6DT6, 6DZ4, 6ER5, 6FH5, 6FY6, 6KA8, 6SA, 6V3, 7AU7, 12AD6, 12AF3, 12AX4, 12BH7, 12BQ6, 12BZ7, 12CA5, 16AQ3, 19J6, 25CD6, 25EH5, 35Z3, 50HK6. Add \$2.40 shipping (Wisconsinites add 5%) Don Diers, 4276-S3 North 50th Street, Milwaukee, WI 53216-1313

FOR SALE; NEW AND USED TUBES, capacitors, cone speakers, send SASE for lists, C. Elmer Nelson, 11 s. Church Street, Princeton, IL 61356.

FOR SALE: NEW IN ORIGINAL BOX, 215-A WESTINGHOUSE \$30.00. ONE BRASSBASE UV-201-A TUBE EX. CONDITION POST PAID. \$20.00 NO TIP USED. CLEON BOOTHE, BOX 235, COHOCTON, NY 14826.

LARGE STOCK OF TUBES FOR TV AND RADIOS 1940'S UP. NEW IN ORIGINAL BOXES. ALSO HAVE SOME TRANSMITTER TUBES. SASE FOR LIST. R. OLMSTED, 605 W. THOMPSON LANE, MURFREESBORO TN 37130. (615) 893-5344.

TUBES — ONE — V 6.00 6U5/6G5 — 6E5 12.00 6L6m 17.00 6L6 GC 10.00 6 & 12 V 3 & 4 PRONG VIBRATORS 12.50 ALL PPD — H. F. BRAMMELL, 204 E. MAPLE, AMERICUS, KS 66835.

TELEVISIONS

RCA TV Model 8PT7010 in red metal case in working condition. Included second set same model for parts. Make offer. John Schellkopf, 1344

Goucher Street, Pacific Palisades, CA 90272.

FOR SALE — ZENITH

THE CABINET IS IN MINT CONDITION and the radio plays. It is a Zenith 12 tube superhetrodyne with a tuning range 540-18400 kyc., chassis 1204-A. Marshall T. Bond, 8718 Linkfair lane, Houston, TX 77025. (713) 668-0029.

FOR SALE: 1940'S VINTAGE ZENITH CONSOLE radio and phonograph. Cabinet is in excellent condition. \$250.00 — Call (815) 838-5398. 5 p.m. to 10 p.m. c.s.t. Dick Stauss, Rt. 1 Box 399, Lockport, IL 60441.

WANTED — EDISON

WANTED FOR EDISON STANDARD phono— model B. 1.) mainspring 2.) decal— trademark and "Edison, 3.) cabinet lid 4.) A. K. breadboard in excellent condition. Carl Hickey, 27404 N. Highway 1, Fort Bragg, CA 95437. (707) 964-0505.

WANTED — GENERAL

WANTED. Oscilloscopes of the 30's. Not working ok if complete, inside & out. Also want 1" to 3" CRT's for early scopes. Have many radios, TVs, parts & literature to swap or will buy. John Kendall, P.O. Box 436, Fallston, MD, 21047.

OLD FIDDLES/ VIOLINS, BANJOS OR MANDOLINS, ETC. ANY CONDITION IF REASONABLE PRICE. THE OLDER THE BETTER. ALSO DO REPAIRS ON FIDDLES/ VIOLINS. CALL OR WRITE JAMES BARNES, 7812 TAZEWELL PIKE, CORRYTON, TN 37721.

OLD BROADCAST OPERATOR IN ARIZONA INTERESTED IN OLD RADIO MEMORABILIA; PAPERS, OLD TUBES, NOVELTIES, SMALL RADIOS, AND COMPONENTS OF THE TWENTIES AND THIRTIES. HAVE RADIOLA 25 WITH LOOP, 6A40 ZENITH WAVEMAGNET, PHILCO 32V FARM RADIO, R.C.A. NAVY SHIP RECEIVER, EICO 950 RC BRIDGE, GERMAN RADIOS, WILCOX GAY TAPE AND RECORD PLAYER, BC 348 RECEIVER, SYLVANIA METAL TUBE CABINET, SYLVANIA JACK-ET, TUBES, CHOKES, METERS, TRANSMITTER COLLINS 32V3, EICO 720, W.E. INTERCOM AND A FEW W.E. TUBES, GONSET COMMUNICATOR IV, GRAY AUDIOGRAPH, STENTYPE MACHINE AND QUACK MEDICAL MACHINES. LIKE TO HEAR FROM COLLECTORS... WAYNE FERNYHOUGH, 1632 W. ROVEY AVENUE, PHOENIX, AZ 85015.

GLASS TUNING DIAL FOR MOTOROLA 5T, ZENITH TOMBSTONE, (AKA WALTON'S RADIO), PHILCO 16B, 90, 70 AND ANY OTHER CATHEDRALS OR TOMBSTONES. MIKE BUKOWSKI, 926 CROWNRISE DRIVE, COLORADO SPRINGS, CO 80904

WANTED. BROWN BAKELITE KNOB and 199 tube socket from Steinite model 990 series radios. Ed Clerkin, 1305 San Marcos Ct., San Luis Obispo, CA 93401. (805) 544-3088.

WANTED: A WIRE RECORDER for playing 3 3/4" spools of recording wire. Used navy equipment. Russell Starkey, 855 Eisenhower Avenue, Jasper, IN 47546. Phone (812) 482-1016.

SIDE TUNING KNOB FOR BELMONT 6D111, manual and schematic for measurements model 80 and Heathkit LG-1 signal generators, RIDERS vols. 16-23, and SAMS 1-700. Looking for a book by the title of "Case Histories of Receiver Troubles and their Remedies," published by Rinehart Books in addition to a hard-cover copy of Tyne's "The Saga of the Vacuum Tube." Am also interested in contacting other collectors in Columbus, Ohio area. Brett Gundlach, 276 E. COMO AVE., COLUMBUS, OHIO 43202, HOME 614) 267-0346, WORK (614) 888-9502.

RADIOLA 28 with 104 speaker, Radiola 25, Radiola 20, Norden Hauck Superhet, Leutz Superhet, Pilot Super Wasp, Pilot parts, Crosley parts, Atwater Kent parts and AK breadboard parts, RCA UZ-1320 horn, Radiola RS, Zenith Super VII or VIII, crystal sets, Burns horn, Emmett A. Smith, 2714 Alden Road, Baltimore, MD 21234.

WANTED— CABINETS FOR RADIOLA X, AND FEDERAL 59, DISPLAY SODION TUBE, UNUSUAL HAND KEYS, INFORMATION ON HALLECK-WATSON COMPANY OF PORTLAND, OREGON. PAT STEWART, W7GVC, 1404 RUTH AVE., WALLA WALLA, WA 99362.

WANTED: ZENITH 11 OR 12 BAND "TRANS-OCEANIC" TRANSISTOR, TOSHIBA "GLOBE-TROTTER," SONY "ORBITER" RECEIVERS OR PARTS, ALSO KLH-21 FM ONLY RADIO. BILL WADE, 657 14TH AVENUE, PROSPECT PARK, PA 19076.

WANTED: ENTIRE WORKS for Capehart 500K, also Edison C-1, C-2, Bal-moral and Alva, Victor 10-51A, Tom Grattelo, 2818 Central, Alameda, CA 94501.

PEERLESS MODEL 19AR-60 9" DYNAMIC speaker with cabinet in good working condition. H-P model 410C VTVM working. RCA Victor R-35 radio in excellent working condition. Simp-

son model 1699 milliohm meter in working condition. Radiola 20 chassis with good audios. Audio transformer for RCA Victor R15 or RCA Radiola 48. Radio Broadcast magazines for 1922 and 1928. Early Canadian Radio magazines such as Canadian Wireless, Radio, etc. Radio News for July, August and October 1919. October 1921, January 1922, August and September 1924. Top prices for good condition magazines. R. A. McNeill, P. O. Box 472, Yorkton, Sask., Canada S3N 2W4 (306) 783-6121.

WANTED: DECANter BOTTLES, ice bucket, shot and drinking glasses for model 9008-B Porto-Baradio made by Stewart Warner. Clarence McGinnis, 1507 N. Glenn Street, Morristown, TN 37814.

WANTED: OWNERS OF EARLY ELECTRICAL magazines, MODERN ELECTRICS, ELECTRICIAN & MECHANIC, etc. I will pay for good photocopies of articles on spark gaps, high frequency Tesla & Oudin coil projects, etc. Need information for forthcoming bibliography. Write first to TCBA, RD3 Box 181, Glens Falls, NY 12801.

WANTED: WWII MILITARY Iconoscope TV camera or tube alone. OK if converted to amateur use, Canadian Marconiphone III regen., IV neustragenaflex, VI, VIIA, VIII, IX, XI. Canadian Westinghouse model W55, W55A, W60A, W57. Hammarlund Trans-Oceanic "Two", De Luxe, Hawk. Kresge Z4 Commander, Karas Short Wave Receiver. D'Arcy Brownrigg, P.O. Box 292, Chelsea, Quebec, JOX 1N0, Canada.

WANTED: A. K. MODEL 55, need everything to mate with gear on tuning condenser. Could also use but not so critical speaker or cone for above. Floor cabinet model, need ivory knob, prefer function for FADA mdl. 790. Will buy junk A.K. if it has at least the tuning parts. C. England, 98 Montague, So. Zanesville, OH 43701.

WANTED: COVER FOR A.K. 55 tin box. Also, 4 tube covers for Advance Neutrowound. Will buy junk set. Jerome Schliepp, 831 Old Berlin Road, Rippon, WI 54971.

C-4 TUBE. for Columbia radio model C-80A. SPRING AND PLATE for A.K. speaker model M. Russ Schoen, E 7340 Nietkze Road, Clintonville, WI 54929. (715) 823-6744.

I BUY BATTERY RADIOS and horns from the 20's, if you have one to sell, send me a card with name, model and price. Rick Parrish, 1260 marilyn Drive, Cape Gir., MO 63701.

WANTED: ZENITH OCEANIC 7000, TOSHIBA- GLOBAL, GRUNDIG SATELLITE OR SONY "ORBITER" BATTERY MULTIBAND SET, WADE, 657 14TH AVENUE, PROSPECT PARK, PA 19076.

WANTED: ONE VERY NICE RADIOLA 100 A LOUD SPEAKER, PLEASE WRITE: PAUL O'PATIK, 316 RUTHERFORD AVENUE, FRANKLIN, NJ 07416.

DO YOU HAVE THAT CLASSICAL 78 ALBUM that has a damaged or missing record? I have an "album singles for sale" listing that I will send to anyone for a 25 cent long self-addressed stamped envelope. Anton Johannes, R.D. #3 Box 253, Pine Bush, NY 12566.

WANTED. I BUY RADIO TV collections. Please send description and price desired. John Kendall, P. O. Box 436, Fallston, MD 21047.

WANTED— SCHEMATIC, ETC. ON BLUE RIBBON AND REMINGTON 5 TUBE RADIOS, OR OTHER RADIOS LIKE THE ABOVE. WANT TO GET THEM WORKING WITH ORIGINAL PARTS. W. G. WEAMER, 390 E. FOSTER ROAD, SANTA MARIA, CA 93455.

WANTED "TENSOR ANALYSIS OF NETWORKS" by Kron; Briggs and Stratton crystal set; accessories for "smokerette" radio. Forrest Baker, 1558 W. Garfield, Davenport, IA 52804.

WANTED — HAMMARLUND

HAMMARLUND CONDENSERS, MC-100, MC50, MCD-35FX, NORMAN CRANE, KF7AS, P.O. BOX 12564, TUCSON, AZ 85732. 749-9140.

WANTED — HEADPHONES

WANTED: NONWORKING OR WORKING headphones: Mesco, Kennedy, Eisenmann, Sampson, Kilbourne Clark, Kellog, Brownies, earliest Brandes with steel headband. Vernon Kostohryz, 600 Lakeside 3A, Brownsville, TX (512) 541-5692.

WANTED — LEUTZ

WANTED FOR LEUTZ MODEL "C" superhet.: 2 Weston No. 301 voltmeter 0 - 10 volts DC. 2 Weston no. 301 ammeter 0-5 amps. DC. 4 General Radio type 231 A audio transformer. 6 special Leutz I.F. transformers. 1 special E.I.S. (Leutz) oscillator coil. 1 special E.I.S. (Leutz) R.F. coupler coil. John A. Rawlins, Jr., 1920 Stephenson Drive, Mesquite, TX 75149. (214) 285-2313.

WANTED — LITERATURE

INSTRUCTION MANUAL FOR EICO MODEL 950 A RC BRIDGE CONDENSER CHECKER. H. F. BRAMMELL, 204 E. MAPLE, AMERICUS, KS 66835.

"WANTED — Operating/ Instruction Manual for Precision signal generator series E-200 and for Sprague Tel-Ohmike resistor condenser analyzer model TO-3. F. Schmidt, 1185 E. Via Entrada, Tucson, AZ 85718"

WANTED: TESLA SUPPLEMENT from the May 1912 MODERN ELECTRICS. Good photocopy OK. Price of no concern. TCBA, RR6, Box 181, Glens Falls, NY 12801.

WANTED OPERATING MANUAL for Precision Tube and Multi-tester #954 Zerox copy OK. Will pay. John G. McDade, #214, 204 E. Joppa Road, Towson, MD 21204.

WANTED: SCHEMATIC TEL-SWEEP GENERATOR. MODEL TSW-50-1948 VISION LABS, JOHN G. MC DADE, 204 E. JOPPA ROAD, #214, TOWSON. MD 21204.

EVERY DAY MECHANICS, VOL. I, NO. 4, MAY 1916 OR A COPY OF "HOW TO BUILD A TRANS- ATLANTIC WIRELESS RECEIVING SET. K. A. LADD, 5240 44TH AVE. S., MPLS., MN 55417. (612) 722-6786.

LAFAYETTE RADIO CATALOGS - 1960 THRU 1968, PLEASE STATE CONDITION AND PRICE. MR. MICHAEL S. SABODISH, SR., 11 - A MATAWAN AVENUE, CLIFFWOOD, NEW JERSEY 07721.

WANTED: OPERATING MANUAL and tube data sheets for Jackson Dynamic tube tester model 636. Zerox copy O.K. Frank Hoffert, 19605 Chardon Road, Cleveland, OH 44117.

WANTED - INFORMATION AND SCHEMATIC for Blaupunkt Sultan 3D radio. Model number unknown, 5 tube AM/FM/ SW. Write Ray Carifio, N4LTS, 6014 SW 33rd Street, Miami, FL 33155

WANTED: LIBRARY BOUND volumes of QST, CQ, 73 PRE 1960. ALSO GLOBE SCOUT (WRL), MIKE GRIMES, K5MLG, 3805 APPOMATTOX CIRCLE, PLANO, TX 75023.

WANTED: SCHEMATIC FOR SILVERTONE MODEL 7166. TOM JOHNSON, 215 E. 7TH STREET, AMES, IA 50010.

WANTED: SCHEMATIC AND INFO on Eico ST 70 amplifier. Gordon Wilson, 11108 - 50 Avenue, Edmonton, Alberta, Canada T6H 0H9.

WANTED: INSTRUCTIONS FOR PACO MODEL

25 IN-CIRCUIT CAPACITOR TESTER RCA WR-50A SIGNAL GENERATOR CRYSTALINER (CRYSTAL MODULES) GENERATOR, GLENN HARTMAN, 5545 DEEP HOLLOW, FAYETTEVILLE, NC 28311.

WANTED — PARTS, TUBES, ETC.

MACHINES SCREWS TO HOLD PANEL TO CABINET, RADIOLA III AND IIIA, I NEED TWO DOZEN. ERNEST HECKLER, 1314 N. SPARKMAN, HARTSELLE, AL 35640.

WANTED — BATTERY RADIO CHASSIS AND/OR ANY INFORMATION ON BRUNSWICK RADIOLA PHONOGRAPH, MODEL BR100, PATENT 1923 — DICK ROZNOVSKY, BOX 480, RICHFIELD, OH 44286.

WANTED: CABINET & AUDIO TRANSFORMERS FOR GREBE CR9, ARTHUR HARRISON, 501 ARBOR DRIVE, COLUMBIA, MD 65201. (314) 474-8729.

DIAL TUNING KNOB AND RESET LOCK SCREW FOR A WARDS 62501 TABLE MODEL RADIO, RIDER 10 - 22, H. F. BRAMMELL, 204 E. MAPLE, AMERICUS, KS 66835.

ZENITH DETECTOR COIL NO. S-8436 USED IN CH, 10A1, 10A2, 10B1, 10B2. ATWATER KENT MODEL 60 A.F. TRANSFORMER ASSEMBLY. L49B BALLAST TUBE. 45 RPM SPINDLE FOR B5R C129 CHANGER EV/GAME 436. CABINET FOR PILOT TV 37. 3KP4 CRT. ELECTRONICS MEASUREMENT CORPORATION. MODEL 502 SIGNAL GENERATOR, ASSEMBLY MANUAL OR SCHEMATIC. AUDIO INPUT XFMRs FOR SINGLE PLATE TO P-P GRIDS. ANY JUNKBOX PARTS, LITERATURE. ANY EARLY TWO AND THREE PIECE CAR RADIOS, UNITED MOTORS, B.O.P., ETC. ANY OTHER FACTORY CAR RADIOS FROM 30'S - 40'S. ANY SIGNAL SEEKING TYPE CAR RADIOS, MUST HAVE KNOBS. CAR RADIO KNOBS. — ALVIN HECKARD, RD1, BOX 83, LEWISTOWN, PA 17044.

EARLY OR UNUSUAL TUBES, tube cans, cartons also early light bulbs pre 1900. Please describe with prices wanted to: Bruce Harbeck, 13408 Westwood Lane, Omaha, NE 68144. (402) 333-9013.

HALLDORSON 3 to 1 audio transformer, copper casing, hand rubber panel 10 x 11 x 1/4. Gordon Wilson, 11108 - 50 Avenue, Edmonton, Alberta, Canada, T6H 0H9.

DETECTOR and AUDIO PORTION of GREBE CR2. Also need cabinet for same. NEED FRONT PANEL FOR SCOTT Phantom DELUXE. Larry Steeno, 2728 42nd Street, Two Rivers, WI 54221. (414) 794-7320.

MARCONIPHONE VIII cabinet, also Marconiphone VI chassis, or com-

plete radios cash, or generous trade. Gordon Wilson, 11108 - 50 Avenue, Edmonton, Alberta, Canada, T6H 0H9.

WANTED: EMPTY CABINET for a Philco model 20 cathedral radio. I already have the radio and speaker. Must be in good condition. Joe Beach, 6515 Sunset, Garden City, MI 48135.

WANTED— CABINET AND PARTS FOR A FEDERAL 61. Mike Kibler, 300 Speiter #39, Danville, IL 61832. (217) 267-3703.

WANTED: ONE TUNING DIAL and one coil tap knob for a Crosley model XJ. Jack Emery, Box #84, 5546 Union Street, Lexington, MI 48450.

TUBES: EARLY UV-217, type CA pliotron, DeForest DV-1 and DV-6, adapter for DeForest type T audion to fit candelabra socket. Parts: rheostat assembly and knob for Tuska 224 rcvr.; case w/hardware for Radiola balanced amplifier. B. T. Wooters, W5KSO, 8303 E. Mansfield Avenue, Denver, CO 80237, (303) 770-5314.

WANTED — PHILCO

PHILCO MODEL 20B 1930 "Baby Grand" radios. Original finish, and no chassis changes a must. Must be completely original and in working condition. Will pay top price for a real nice one. All replies will be answered. Write: Ronald G. Burtzos, 915 Crane Drive, Apt. 703, DeKalb, IL 60115.

PHILCO MODEL 90B, working or not. Original speaker from Philco model 20— must be in good shape. Thomas Abell, 1022 S. Edison Ave., South Bend, IN 46619. Phone (219) 234-8405.

CHASSIS ONLY FOR PHILCO cathedral, model 37-61, Charles A. D'Alessio, 136 Changebridge Road, K4, Montville, NJ 07045. ((201) 263-4747.

WANTED — PLASTICS

WANTED: CATALIN RADIOS. All makes: FADA, OSWALD, EMERSON, MOTOROLA, etc. Top prices paid. R. Wayne Oliver, 355 Highwood Avenue, Leonia, NJ 07605. (201) 944-0777.

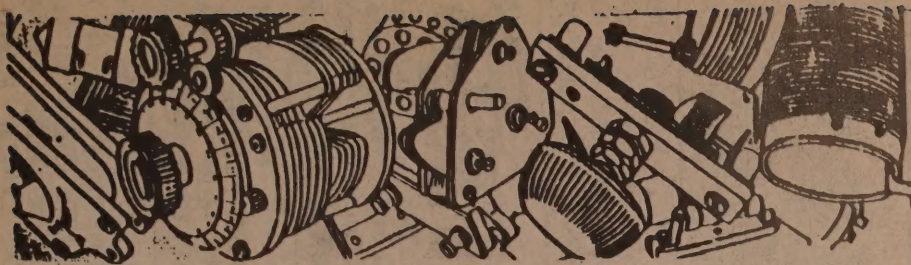
WANTED — ZENITH

ZENITH TRANSISTOR Trans-Oceanic 11 or 12 band radio- parts or complete. Have Rider TV manuals 2 thru 23 for offer. Wade, 657 14th Ave., Prospect Park, PA 19076.

October

THE HORN SPEAKER

1988



OLDE TYME RADIO CO.

Need hard to find Olde Tyme Radio parts such as:

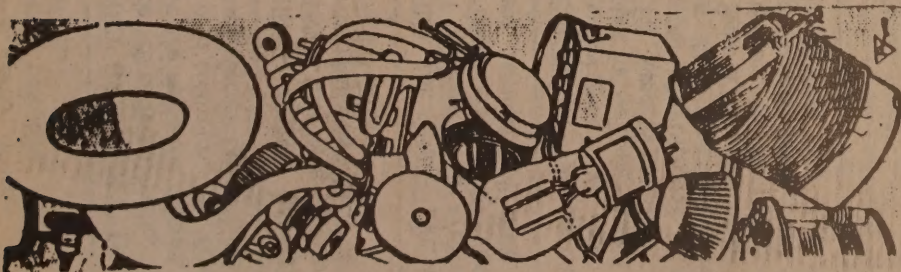
- | | |
|---|---|
| * Antique twisted, black,
2-wire cloth covered cord. | * Vintage Tubes |
| * AK Style Battery Cable | * Headphones |
| * Olde Tyme Hookup Wire | * Headphone & Speaker cords |
| * Brown Silk Type Power Cord | * Ant, RF, OSC & IF Coils |
| * Gold Silk Type Power Cord | * Speaker Grill Cloth |
| * Audio, Interstage & Out-
put Transformers | * Pilot lamps |
| | * Olde Tyme Ball Handle
toggles switches |

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